CLAIMS

I claim:

1. A thermoplastic composition created from the melt blending of a first polymer together with a secondary polymer in the presence of a catalyst, together with at least one isocyanate or epoxy compound.

2. The composition of Claim 1 wherein an interpenetrating network is created within said thermoplastic composition.

3. A thermoplastic composition created from the blending of a melted first polymer together with a secondary polymer in the presence of a catalyst, together with at least one isocyanate or epoxy compound, said blending resulting in the formation of at least one interpenetrating network within said thermoplastic composition.

4. The composition of Claim 1 wherein said secondary polymer is incompatible for blending with said first polymer.

5. The composition of Claim 1 wherein said secondary polymer is compatible for blending with said first polymer.

6. The composition of Claim 1 wherein said components are dynamically blended.

7. The composition of Claim 1 wherein said components are not dynamically blended.

8. The composition of Claim 1 wherein said secondary polymer is dissimilar to said first polymer.

9. The composition of Claim 1 wherein said first polymer is polyethylene terephthalate.

10. The composition of Claim 9 wherein an interpenetrating network is created within said thermoplastic composition.

11. The composition of Claim 9 wherein said first polymer comprises between 60 to 99 weight percent of the total blend.

12. The composition of Claim 1 wherein said first polymer is a recyclate.

13. The composition of Claim 1 wherein said secondary polymer is a polycarbomide.

14. The composition of Claim 1 wherein said catalyst is compounded into said secondary polymer in advance of blending.

15. The composition of Claim 1 wherein said isocyanate or epoxy compound is methylenediphenylene diisocyanate ("MDI").

16. The composition of Claim 1 wherein the number of isocyanate or epoxy compounds is one.

17. The composition of Claim 1 wherein the number of isocyanate or epoxy compounds is more than one.

18. The composition of Claim 1 wherein said catalyst is present at a level of 0.001 to 5.0 weight percent, based on the weight of said first polymer.

19. The composition of Claim 1 wherein said secondary polymer used is in the range of 1 to 40 weight percent of the total blend.

20. The composition of Claim 1 wherein said isocyanate or epoxy compound used is in the range of 0.1 to 3.0 weight percent, based on the weight of said first polymer.

21. The composition of Claim 1 further comprising vinyl siloxane as an oxygen barrier.

22. The composition of Claim 1 further comprising at least one heat stabilizer component.

23. A process for creating a thermoplastic composition, said process comprising melt blending of the following components at a melt temperature:

    a) a first polymer;
    b) a secondary polymer;
    c) at least one catalyst; and
    d) at least one isocynate or epoxy compound.

24. The process of Claim 23 wherein said thermoplastic composition contains at least one interpenetrating network.

25. The process of Claim 23 wherein said melt blending is dynamic.

26. The process of Claim 23 wherein said melt blending is not dynamic.

27. The process of Claim 23 wherein said secondary polymer is incompatible for blending with said first polymer.

28. The process of Claim 23 wherein said secondary polymer is dissimilar to said first polymer.

29. The process of Claim 23 wherein said secondary polymer is compatible for blending with said first polymer.

30. The process of Claim 23 wherein said first polymer is polyethylene terephthalate.

31. The process of Claim 23 wherein an interpenetrating network is created within the thermoplastic composition.

32. The process of Claim 23 wherein said secondary polymer is from the group of aliphatic and aromatic polyolefins.

33. The process of Claim 23 wherein said secondary polymer is from the group: polyethylene, ethylene vinyl acetate or polypropylene.

34. The process of Claim 23 wherein said at least one catalyst is a nucleating agent.

35. The process of Claim 23 wherein said secondary polymer is a polyamite.

36. The process of Claim 23 wherein said secondary polymer is an EVA copolymer.

37. The process of Claim 23 wherein said nucleating agent is polydimethyl siloxane.

38. The process of Claim 23 wherein said at least one catalyst is selected from the group: dibutyltin dilaurate, maleate, precursors for phenolic resin, urea, melamine, dioctyltin dilaurate, sulphuric acid, sodium acetate, zinc chloride, carbomide, 5-phenyltetrazole, tert-butyl peroxy 2-ethylhexyl carbonate, tert-butyl

peroxy-3,5,5-trimethylhexanoate, 2,5-Dimethyl-2,5-di(tert-butylperoxy)hexane, tert-butyl peroxybenzoate.

39. The process of Claim 38 wherein the number of catalysts is one.

40. The process of Claim 38 wherein the number of catalysts is more than one.

41. The process of Claim 23 wherein said isocynate is selected from the group: 4,4'-phenylmethane diisocyanate (MDI), polymethylene polyphenyl, polyisocyanate (PAPI).

42. The process of Claim 23 wherein said epoxy is selected from the group: phenols, bisphenols, aromatic epoxy resin and cycloaliphatic epoxy resin.

43. The process of Claim 23 wherein the melt temperature is sufficient to ensure at least two phases have 3-dimensional spatial continuity resulting from the dynamic curing in the presence of said catalyst.

44. The process of Claim 23 further comprising addition of a hydrocarbon gas during blending.

45. The process of Claim 23 wherein said first polymer is from a scrap source.

46. The process of Claim 23 wherein residues of barrier-coatings are present in said first polymer.

47. The process of Claim 46 wherein said barrier-coatings are polyamides or florocarbons.

48. The process of Claim 23 further comprising the addition of at least one hydrocarbon foaming agent during said melt blending.

49. The process of Claim 48 wherein said hydrocarbon foaming agent is selected from the group of: isopentane, cyclopentane, carbon dioxide, n-pentane, nitrogen, butane, isohexane, heptane and chlorodifloro-methane.

50. The process of Claim 23 wherein said catalyst is at least one nucleating agent selected from the following group: talc, calcium fluoride, sodium phenylphosphinate, aluminum oxide, titanium dioxide, finely divided polytetrafluoroethylene, teflon, or pyromellitic dianhydride (PMDA), sulfuric acid, iron oxide or any base earth metal groups.

51. The process of Claim 23 wherein said catalyst is added at a rate of between 0.001 to 5 weight percent, based on the weight of said first polymer.

52. The process of Claim 23 further comprising the addition of at least one of the following additives during blending: antioxidants, stabilizers, dyes, flame-retardants, extenders, UV stabilizers and processing aids.

53. The process of Claim 23 further comprising the addition of vinyl siloxane in a sufficient amount to form a surface oxygen barrier in the completed product.

54. The process of Claim 23 wherein said melt blending is performed in an extruder.

55. The process of Claim 54 further comprising coating said thermoplastic composition with an oxygen inhibiting barrier coat compatible with said first polymer upon its exiting the extruder.

56. The process of Claim 23 wherein said melt blending is performed in an application unit.

57. The process of Claim 56 wherein the application unit is an injection molder.

58. The process of Claim 23 wherein said catalyst is present at a level of 0.001 to 10.0 weight percent, based on the weight of said first polymer.

59. The process of Claim 23 further comprising the addition of at least one additional heat stabilizer during the melt blending.

60. The process of Claim 59 wherein said catalyst and said additional heat stabilizer are compounded into an EVA carrier resin or vinyl base carrier resin

61. The process of Claim 23 wherein said catalyst is compounded into an elastomer.

62. The process of Claim 23 wherein said catalyst is compounded into a CPE polyolefin.

63. The process of Claim 60 wherein the carrier resin is a polyolefin which comprises from 2 to 6 carbon atoms.

64. The process of Claim 23 further comprising rapidly cooling the blended thermoplastic composition upon completion of the melt blending step.

65. The process of Claim 48 wherein said at least one foaming agent changes phases from gas to liquid form upon cooling of the blended thermoplastic composition.

66. The process of Claim 48 wherein said at least one foaming agent is present in the cooled thermoplastic composition in such a fashion that said thermoplastic composition can be foamed in secondary manufacturing.

67. The process of Claim 64 wherein said blended thermoplastic is cooled in pellet form.

68. The process of Claim 64 wherein said blended thermoplastic composition is cooled in sheet form.